

QUICK REVIEW 1.7 (For help, go to Section P.3 and P.4.)

In Exercises 1–10, solve the given formula for the given variable.

1. **Area of a Triangle** Solve for h : $A = \frac{1}{2}bh$

2. **Area of a Trapezoid** Solve for h : $A = \frac{1}{2}(b_1 + b_2)h$

3. **Volume of a Right Circular Cylinder** Solve for h :
 $V = \pi r^2 h$

4. **Volume of a Right Circular Cone** Solve for h :
 $V = \frac{1}{3}\pi r^2 h$

5. **Volume of a Sphere** Solve for r : $V = \frac{4}{3}\pi r^3$

6. **Surface Area of a Sphere** Solve for r : $A = 4\pi r^2$

7. **Surface Area of a Right Circular Cylinder** Solve for h :
 $A = 2\pi rh + 2\pi r^2$

8. **Simple Interest** Solve for t : $I = Prt$

9. **Compound Interest** Solve for P : $A = P\left(1 + \frac{r}{n}\right)^{nt}$

10. **Free-Fall from Height H** Solve for t : $s = H - \frac{1}{2}gt^2$

SECTION 1.7 EXERCISES

In Exercises 1–10, write a mathematical expression for the quantity described verbally:

- Five more than three times a number x .
- A number x increased by 5 and then tripled.
- Seventeen percent of a number x .
- Four more than 5% of a number x .
- Area of a Rectangle** The area of a rectangle whose length is 12 more than its width x .
- Area of a Triangle** The area of a triangle whose altitude is 2 more than its base length x .
- Salary Increase** A salary after a 4.5% increase, if the original salary is x dollars.
- Income Loss** Income after a 3% drop in the current income of x dollars.
- Sale Price** Sale price of an item marked x dollars, if 40% is discounted from the marked price.
- Including Tax** Actual cost of an item selling for x dollars if the sales tax rate is 8.75%.

In Exercises 11–14, choose a variable and write a mathematical expression for the quantity described verbally.

- Total Cost** The total cost is \$34,500 plus \$5.75 for each item produced.
- Total Cost** The total cost is \$28,000 increased by 9% plus \$19.85 for each item produced.
- Revenue** The revenue when each item sells for \$3.75.
- Profit** The profit consists of a franchise fee of \$200,000 plus 12% of all sales.

In Exercises 15–20, write the specified quantity as a function of the specified variable. It will help in each case to draw a picture.

- The height of a right circular cylinder equals its diameter. Write the volume of the cylinder as a function of its radius.
- One leg of a right triangle is twice as long as the other. Write the length of the hypotenuse as a function of the length of the shorter leg.
- The base of an isosceles triangle is half as long as the two equal sides. Write the area of the triangle as a function of the length of the base.
- A square is inscribed in a circle. Write the area of the square as a function of the radius of the circle.
- A sphere is contained in a cube, tangent to all six faces. Find the surface area of the cube as a function of the radius of the sphere.
- An isosceles triangle has its base along the x -axis with one base vertex at the origin and its vertex in the first quadrant on the graph of $y = 6 - x^2$. Write the area of the triangle as a function of the length of the base.

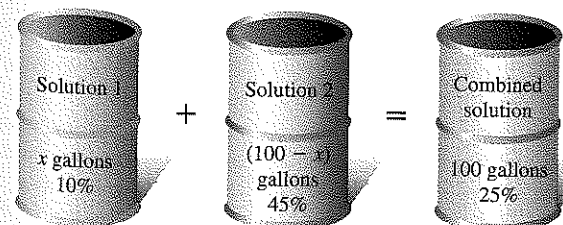
In Exercises 21–36, write an equation for the problem and solve the problem.

- One positive number is 4 times another positive number. The sum of the two numbers is 620. Find the two numbers.
- When a number is added to its double and its triple, the sum is 714. Find the three numbers.
- Salary Increase** Mark received a 3.5% salary increase. His salary after the raise was \$36,432. What was his salary before the raise?

- Consumer Price Index** The consumer price index for food and beverages in 2003 was 184.0 after a hefty 2.3% increase from the previous year. What was the consumer price index for food and beverages in 2002? (Source: U.S. Bureau of Labor Statistics)
- Travel Time** A traveler averaged 52 miles per hour on a 182-mile trip. How many hours were spent on the trip?
- Travel Time** On their 560-mile trip, the Bruins basketball team spent two more hours on the interstate highway than they did on local highways. They averaged 45 mph on local highways and 55 mph on the interstate highways. How many hours did they spend driving on local highways?
- Sale Prices** At a shirt sale, Jackson sees two shirts that he likes equally well. Which is the better bargain, and why?



- Job Offers** Ruth is weighing two job offers from the sales departments of two competing companies. One offers a base salary of \$25,000 plus 5% of gross sales; the other offers a base salary of \$20,000 plus 7% of gross sales. What would Ruth's gross sales total need to be to make the second job offer more attractive than the first?
- Personal Computers** From 1996 to 1997, the worldwide shipments of personal computers grew from 71,065,000 to 82,400,000. What was the percentage increase in worldwide personal computer shipments? (Source: Dataquest)
- Personal Computers** From 1996 to 1997, the U.S. shipments of personal computers grew from 26,650,000 to 30,989,000. What was the percentage increase in U.S. personal computer shipments? (Source: Dataquest)
- Mixing Solutions** How much 10% solution and how much 45% solution should be mixed together to make 100 gallons of 25% solution?



(a) Write an equation that models this problem.

(b) Solve the equation graphically.

- Mixing Solutions** The chemistry lab at the University of Hardwoods keeps two acid solutions on hand. One is 20% acid and the other is 35% acid. How much 20% acid solution and how much 35% acid solution should be used to prepare 25 liters of a 26% acid solution?

- Maximum Value Problem** A square of side x inches is cut out of each corner of a 10 in. by 18 in. piece of cardboard and the sides are folded up to form an open-topped box.

(a) Write the volume V of the box as a function of x .

(b) Find the domain of your function, taking into account the restrictions that the model imposes in x .

(c) Use your graphing calculator to determine the dimensions of the cut-out squares that will produce the box of maximum volume.

- Residential Construction** DDL Construction is building a rectangular house that is 16 feet longer than it is wide. A rain gutter is to be installed in four sections around the 136-foot perimeter of the house. What lengths should be cut for the four sections?

- Protecting an Antenna** In Example 3, suppose the parabolic dish has a 32 in. diameter and is 8 in. deep, and the radius of the cardboard cylinder is 8 in. Now how tall must the cylinder be to fit in the middle of the dish and be flush with the top of the dish?

- Interior Design** Renée's Decorating Service recommends putting a border around the top of the four walls in a dining room that is 3 feet longer than it is wide. Find the dimensions of the room if the total length of the border is 54 feet.

- Finding the Model and Solving** Water is stored in a conical tank with a faucet at the bottom. The tank has depth 24 inches and radius 9 in., and it is filled to the brim. If the faucet is opened to allow the water to flow at a rate of 5 cubic inches per second, what will the depth of the water be after 2 minutes?

- Investment Returns** Reggie invests \$12,000, part at 7% annual interest and part at 8.5% annual interest. How much is invested at each rate if Reggie's total annual interest is \$900?

- Unit Conversion** A tire of a moving bicycle has radius 16 in. If the tire is making 2 rotations per second, find the bicycle's speed in miles per hour.

- Investment Returns** Jackie invests \$25,000, part at 5.5% annual interest and the balance at 8.3% annual interest. How much is invested at each rate if Jackie receives a 1-year interest payment of \$1571?